

lation shifts and the increasing use of sugar by food processors, who have also been affected by population changes. There has been no increase in sugar deliveries in the New England States and only a minor one in the Mid-Atlantic States, compared with major increases in the North-Central, Southern, and Western States (table 41).

Deliveries of beet sugar have been heavily concentrated in the north-central and western regions since 1948, although since 1962 there have been small increases in such deliveries in the Mid-Atlantic and Southern States. The increase in the North-Central States from 1948-52 to 1963-67 amounted to an average of 681,000 tons, 57 percent of the total increase in beet deliveries; 33 percent of the increase was in the Western States.

The increase in beet sugar deliveries in the North-Central States is especially significant for competition with cane sugar coming from the Atlantic and Gulf coasts. Since World War II, north-central beet sugar deliveries increased from 42 to 52 percent of total sugar deliveries in the region. During the same period, the price of refined sugar in Chicago declined appreciably relative to cane sugar prices in New York (table 42). The price quotations for beet sugar in the Chicago Chicago area, relative to cane sugar prices in New York, declined 1 cent a pound between 1949-52 and 1963-67. The declines in other areas were substan-

tial, although not so large as in Chicago. Cane sugar prices outside the Northeast also declined, relative to New York prices, but generally not so much as beet sugar prices. Price declines for cane sugar were considerably lower in the Gulf and Southeastern States than in other areas. Price declines compared with New York prices were somewhat smaller in 1968 when the proportion of beet sugar in all sugar deliveries was smaller than in preceding years.

Price Movements of Sugarbeets and Sugarcane

These shifts in the geographic pattern of sugar prices affected prices farmers received for sugarbeets and sugarcane. For instance, the average price per ton of beets received by growers increased by only about 30 percent from 1948-52 to 1968-72 (table 43). The price basis (sales receipts less marketing expenses), which was a major factor determining the price processors paid for beets, increased 26 percent.

Producers of mainland cane fared better in terms of price increases than sugarbeet growers or producers of sugarcane in Puerto Rico. Average sugarcane prices received by growers in Louisiana and Florida during 1968-72 were 37 percent above those for 1948-52. Grower prices for mainland sugarcane were essentially a function of the New York price of raw

Table 41—Deliveries of refined sugar by major geographic divisions, averages for 1948/52, 1953/57, 1958-62, 1963-67, 1968-72, 1973-74

Type of sugar and period	New England	Mid-Atlantic	North Central	Southern	Western	United States
----- 1,000 short tons, refined sugar -----						
Cane sugar:						
1948-52	412	1,745	1,254	1,930	424	5,765
1953-57	407	1,832	1,379	2,173	473	6,264
1958-59	422	1,882	1,417	2,404	477	6,602
1963-67	402	1,883	1,435	2,493	499	6,712
1968-72	412	1,969	1,626	2,777	518	7,302
1973	427	1,944	1,687	2,921	512	7,491
1974	403	1,886	2,042	2,865	519	7,715
Beet sugar:						
1948-52	0	2	907	74	545	1,528
1953-57	0	10	1,000	75	666	1,751
1958-62	0	32	1,267	89	789	2,177
1963-67	4	57	1,588	128	941	2,718
1968-72	8	48	1,863	139	1,089	3,147
1973	(¹)	55	1,974	144	1,109	3,282
1974	N.A.	21	1,562	103	1,142	2,828
Cane and beet sugar:						
1948-52	412	1,747	2,161	2,004	969	7,293
1953-57	407	1,842	2,379	2,248	1,139	8,015
1958-62	422	1,914	2,684	2,493	1,266	8,779
1963-67	406	1,940	3,023	2,621	1,440	9,430
1968-72	420	2,017	3,489	2,916	1,607	10,449
1973	427	1,999	3,661	3,065	1,621	10,773
1974	403	1,907	3,604	2,968	1,661	10,543

¹ Less than .5.

N.A. - Not available.

Source: Sugar Statistics and Related Data, Vol. 1, Bul. 293, Agr. Stabil and Conserv. Serv., U.S. Dept. of Agr.

Table 42—Comparative trends in quoted wholesale prices of refined sugar in various areas of the United States

Period	New York price of refined sugar	Difference from New York price ²						
		Cane sugar				Beet sugar		
		Chicago	Pacific Coast	Gulf	Southeast	Chicago	Pacific Coast	Eastern
----- <i>Cents per pound</i> -----								
1949-52 ¹	8.24	+0.1	+0.7	-0.1	-0.1	-0.16	-0.03	-0.18
1953-57	8.79	-0.18	-0.7	-0.15	-0.11	-0.38	-0.17	-0.27
1958-62	9.41	-0.48	-0.37	-0.23	-0.18	-0.67	-0.39	-0.70
1963-67	10.76	-0.91	-0.91	-0.63	-0.55	-1.16	-0.87	-1.11
1968-72	11.96	-1.03	-1.00	-0.88	-0.64	-1.03	-1.10	-1.03
1973	14.07	-1.59	-1.69	-0.93	-0.29	-1.69	-1.69	-1.71
1974	34.35	-0.8	-2.23	-0.19	-0.01	-2.28	-2.45	-2.16

¹ Data for 1948 are not available. ² Approximate boundaries for these areas are shown in "sugar reports," No. 81, p. 6, U.S. Dept. of Agr., Agr. Commodity Stabil. Serv., January 1959.

Table 43—Prices of sugarbeets, sugarcane, and sugar in the United States

Crop years (Oct.-Sept.)	Processor payments per ton ¹			Price per pound			
	Beets	Mainland cane	Puerto Rico cane	Raw sugar, New York	Refined sugar, wholesale, New York	Refined sugar, retail, U.S. average	Basis of payment for beets
----- <i>Dollars</i> ----- ----- <i>Cents</i> -----							
1948-52	11.20	6.62	7.94	6.04	8.29	10.0	7.00
1953-57	11.33	7.13	8.03	6.12	9.07	10.7	7.20
1958-62	11.71	7.63	7.60	6.53	9.76	11.9	7.47
1963-67	12.45	8.62	8.29	7.16	10.64	12.29	7.99
1968-72	14.61	10.55	7.32	8.57	12.40	13.39	9.42
1973/74	31.66	21.26	8.26	20.39	34.41	23.82	19.95
1974/75	N.A.	49.07	28.90	30.61	39.93	42.78	N.A.

¹ Processor payments only. ² Preliminary.

N.A. Not available.

Source: Sugar Statistics and Related Data, Vol. 1, Bul. 293, and Vol. II, Bul. 244, Agr. Stabil. and Conserv. Serv., U.S. Dept. of Agr.

sugar at certain times of the year and the quality (sucrose content and juice purity) of the cane. Average raw sugar prices during this period rose only 30 percent. However, the quality of mainland sugarcane improved substantially. A part of this improvement resulted from the increasing proportion of mainland cane grown in Florida where the sucrose content is higher. The average sucrose content of cane grown in Louisiana also increased but not to the Florida level.

The average price of sugarcane received by Puerto Rican growers increased only 4 percent from 1948-52

to 1968-72, much less than the increase in the New York raw sugar price. A decline in the quality of Puerto Rican sugarcane was partly responsible.

Because the Hawaiian sugar industry is much more integrated than those in other areas, statistics showing the price of sugarcane are not available. However, most of the sugar produced in Hawaii is refined in California, and the sugar is sold in much the same area as beet sugar. Consequently, returns to the Hawaiian sugar industry likely are similar to those for the beet industry.

NONSUGAR SWEETENERS: RECENT DEVELOPMENTS

The use of certain nonsugar sweeteners, used partly as substitutes for sugar, increased rapidly after World War II. Sugar has two principal economic characteristics; it is sweet, and it is nutritive. All sugar substitutes are sweet in some degree; some are nutri-

tive, others are not. The nutritive sweeteners which compete with sugar (sucrose) are largely those manufactured from starch and known in the United States as corn sirup and dextrose, although honey, maple, and other sirups also belong in this category. The

principal nonnutritive substitutes for sugar, saccharin and cyclamate are manufactured from nonagricultural materials.

Trends in the Use of Starch Sweeteners

The use of corn sirup and dextrose increased considerably during World War II when sugar was in short supply. After the war, when the supply of sugar increased, the use of corn sweeteners declined to about the prewar share of the sweetener market and remained there for several years (38). Beginning in 1957, the consumption of starch sweeteners, particularly corn sirup, started increasing more rapidly than that of sugar (table 44). During 1957-67, the growth in consumption of caloric sweeteners (sugar, dextrose, and corn sirup) by all users averaged 231,000 tons per year; of this increase, 66 percent was sugar, 8 percent dextrose, and 26 percent corn sirup (9,10,11,12,13,14). But the average quantity of sugar consumed was much larger than that of dextrose or corn sirup. And the rate of increase, based on the average annual consumption of each sweetener, was lowest for sugar (1.7 percent), slightly more for dextrose (4.6 percent), and highest for corn sirup (6.0 percent).

Most of the starch sweeteners are used by industrial processors of food and other products (61), although a sizable but declining proportion of sugar is consumed in households and other nonindustrial establishments. Nonindustrial use of sugar in the United States has remained comparatively stable in

quantity, although declining somewhat since 1963. The use of each of the caloric sweeteners by industry has increased substantially since 1957 and at about the same rate for the first 6 years of the period. But since 1962, the growth rate for sugar has been somewhat slower than that for corn sirup (tables 45, 46, and 47).

Although the proportions of the various sweeteners used by all industrial processors has not changed greatly since 1957, this stability represents an average of quite diverse trends in individual industries. For instance, in the baking, canning, and dairy industries, purchases of sugar increased after 1957, but the rate was slower than those for other caloric sweeteners so that sugar has constituted a declining proportion of the total caloric sweeteners purchased. The beverage industry is the largest industrial purchaser of sugar, and in this case sugar maintained its share of the caloric sweetener market at around 95 percent. Sugar also maintained its share of the sweetener purchases in the confectionery industry and in the category labeled "other foods."

About half the dextrose used in the United States during this period was delivered to the baking industry, where it was used primarily in products manufactured with yeast to assist the process of fermentation. The proportion of dextrose in the baking industry's total purchases of caloric sweeteners declined slightly since 1957, largely because of the increased use of corn sirup. More dextrose was used in nonfood industries than in any of the food industries except baking. Moreover, the use of dextrose for

Table 44—Distribution of principal caloric sweeteners to all U.S. users, 1957-74

Year	Quantity consumed				Percentage of total consumed			
	Sugar	Dextrose ¹	Corn sirup ¹	Total	Sugar	Dextrose	Corn sirup	Total
	--- 1,000 tons ---				--- Percent ---			
1957	7,950	307	737	8,994	88.4	3.4	8.2	100.0
1958	8,210	354	781	9,345	87.8	3.8	8.4	100.0
1959	8,336	376	832	9,544	87.4	3.9	8.7	100.0
1960	8,423	373	865	9,661	87.1	3.9	9.0	100.0
1961	8,775	384	889	10,048	87.3	3.8	8.9	100.0
1962	8,881	410	987	10,278	86.4	4.0	9.6	100.0
1963	9,137	464	1,055	10,656	85.7	4.4	9.9	100.0
1964	8,839	463	1,170	10,472	84.4	4.4	11.2	100.0
1965	9,183	465	1,189	10,837	84.7	4.3	11.0	100.0
1966	9,523	459	1,229	11,211	84.9	4.1	11.0	100.0
1967 ²	9,488	493	1,134	11,372	83.4	4.8	11.8	100.0
1968 ²	10,106	506	1,228					
1969 ²	9,884	502	1,264	11,650	84.9	4.3	10.8	100.0
1970	10,621	554	1,336	12,511	84.9	4.4	10.7	100.0
1971	10,610	583	1,418	12,611	84.1	4.6	11.3	100.0
1972	10,720	545	1,600	12,865	83.3	4.2	12.5	100.0
1973 ²	10,771	600	1,850 ³	13,221	81.5	4.5	14.0	100.0
1974 ²	10,539	625	2,150 ³	13,314	79.2	4.7	16.1	100.0

¹ Dry basis. ² Estimates. ³ Includes high-fructose corn sirup production.

Source: Sugar Report, Agr. Stabil. and Conserv. Serv., U.S. Dept of Agr., through 7/75, and Sugar Market News, Agr. Mkt. Serv., U.S. Dept. of Agr., 8/75 through 1/76.

Table 45—Sugar deliveries to U.S. processing industries, with sugar deliveries as percentage of total sugar, dextrose, and corn sirup deliveries, for each type of industry, 1957-74

Year	Baking	Beverage	Canning	Confec- tionery	Dairy	Other foods	Nonfoods	Total
--- 1,000 tons ---								
1957	931	945	737	766	330	298	56	4,063
1958	949	953	751	727	344	307	57	4,088
1959	960	1,114	798	733	370	319	54	4,348
1960	1,048	1,148	790	804	366	297	65	4,518
1961	1,078	1,210	855	842	395	263	79	4,722
1962	1,120	1,322	847	863	398	267	79	4,896
1963	1,170	1,436	863	894	436	263	69	5,131
1964	1,082	1,400	853	865	438	359	61	5,058
1965	1,156	1,560	838	959	452	451	55	5,471
1966	1,234	1,740	878	1,000	483	441	75	5,851
1967	1,286	1,785	843	1,004	486	424	66	5,894
1968	1,396	2,025	923	1,085	516	471	72	6,488
1969	1,344	2,099	916	1,037	528	442	72	6,438
1970	1,468	2,357	928	1,106	547	426	83	6,915
1971	1,356	2,364	1,029	1,052	556	496	93	6,946
1972	1,449	2,437	987	1,057	599	508	91	7,128
1973	1,454	2,469	1,025	1,035	595	502	111	7,191
1974	1,443	2,350	949	1,019	570	514	128	6,973
<i>Percent of total deliveries of sugar, dextrose, and corn sirup</i>								
1957	81.0	95.4	87.6	71.0	86.6	55.8	47.9	79.8
1958	78.8	95.2	86.9	68.5	86.2	56.0	42.9	78.4
1959	77.7	95.6	86.3	69.0	85.4	55.3	37.5	78.5
1960	78.9	94.6	85.4	70.2	83.7	55.6	39.4	78.6
1961	78.9	94.4	85.5	70.8	83.5	55.7	39.7	78.9
1962	77.7	93.6	84.1	70.2	81.2	51.2	44.4	78.0
1963	74.8	94.3	82.7	70.8	79.3	50.0	42.6	77.4
1964	72.4	93.9	79.9	68.8	77.1	56.0	39.3	75.8
1965	73.6	94.5	80.5	70.6	75.5	61.4	35.7	77.0
1966	75.4	95.4	80.3	71.0	76.6	59.2	42.2	77.8
1967	76.7	95.0	80.2	71.4	76.1	60.6	38.4	78.4
1968	77.8	95.3	81.6	72.4	75.1	59.2	38.1	78.9
1969	77.1	95.3	81.9	71.3	74.0	57.2	36.6	78.5
1970	77.4	85.4	81.8	71.5	73.2	54.5	36.6	78.5
1971	76.3	96.5	83.8	69.3	72.1	51.1	39.7	77.6
1972	76.2	96.0	81.9	68.0	72.4	50.5	37.6	76.9
1973	73.2	92.5	78.1	67.4	69.3	49.8	41.1	74.6
1974	70.2	88.5	72.4	66.7	64.9	50.1	43.8	71.5

Source: Sugar Report, Agr. Stabil. and Conserv. Serv., U.S. Dept of Agr., through 7/75, and Sugar Market News, Agr. Mkt. Serv., U.S. Dept. of Agr., 8/75 through 1/76.

Table 46—Dextrose deliveries to U.S. processing industries, with dextrose deliveries as percentage of total sugar, dextrose, and corn sirup deliveries, for each type of industry, 1957-74¹

Year	Baking	Beverage	Canning	Confec- tionery	Dairy	Other foods	Nonfoods	Total
--- 1,000 tons ---								
1957	161	20	26	19	9	21	38	294
1958	195	20	29	20	8	26	44	342
1959	205	19	27	20	8	36	48	363
1960	200	27	27	20	9	25	57	365
1961	199	28	26	22	8	25	64	372
1962	213	29	24	25	7	27	71	396
1963	246	35	31	30	7	30	65	444
1964	231	38	32	37	6	36	66	446
1965	229	39	33	36	6	37	68	448
1966	217	35	34	34	7	41	69	438
1967 ²	200	43	34	42	6	95	73	493
1968 ²	199	32	35	44	6	110	80	506
1969 ²	192	20	33	45	6	121	85	502
1970	206	10	36	52	7	145	98	554
1971	187	9	35	57	8	196	91	583
1972	164	9	32	60	7	183	90	545
1973 ²	197	15	41	62	7	182	96	600
1974 ²	221	18	49	59	8	172	98	625
<i>Percent of total deliveries of sugar, dextrose, and corn sirup</i>								
1957	14.0	2.0	3.1	1.8	2.4	3.9	32.5	5.8
1958	16.2	2.0	3.4	1.9	2.0	4.7	33.1	6.6
1959	16.6	1.6	2.9	1.9	1.9	6.2	33.3	6.5
1960	15.1	2.2	2.9	1.7	2.1	4.7	34.5	6.4
1961	14.5	2.2	2.6	1.8	1.7	5.3	32.2	6.2
1962	14.8	2.0	2.4	2.0	1.4	5.2	39.9	6.3
1963	15.7	2.3	3.0	2.4	1.3	5.7	40.1	6.7
1964	15.4	2.5	3.0	3.0	1.1	5.6	42.6	6.7
1965	14.6	2.4	3.2	2.7	1.0	5.0	44.2	6.3
1966	13.2	1.9	3.1	2.4	1.1	5.5	38.7	5.8
1967	12.0	2.3	3.2	3.0	.9	13.6	42.4	6.5
1968	11.1	1.5	3.1	2.9	.9	13.8	42.3	6.2
1969	11.0	.9	2.9	3.1	.8	15.7	43.1	6.1
1970	10.8	.4	3.2	3.4	.9	18.5	43.2	6.3
1971	10.5	.4	2.8	3.8	1.0	20.2	38.9	6.5
1972	8.6	.4	2.7	3.8	.9	18.2	37.2	5.9
1973	9.9	.6	3.1	4.0	.8	18.1	35.6	6.2
1974	10.7	.7	3.7	3.9	.9	16.8	33.6	6.4

¹ Dry basis. ² Estimates.

Source: Sugar Report, Agr. Stabil. and Conserv. Serv., U.S. Dept. of Agr., through 7/74, and Sugar Market News, Agr. Mkt. Serv., U.S. Dept. of Agr., 8/75 through 1/76.

Table 47—Corn sirup deliveries to U.S. processing industries, with corn sirup deliveries as percentage of total sugar, dextrose, and corn sirup deliveries, for each type of industry, 1957-74¹

Year	Baking	Beverage	Canning	Confec- tionery	Dairy	Other foods	Nonfoods	Total
--- 1,000 tons ---								
1957	59	26	78	294	42	215	23	737
1958	61	28	84	314	47	215	32	781
1959	71	33	100	309	55	222	42	832
1960	80	38	108	322	62	212	43	865
1961	90	44	119	326	70	184	56	889
1962	109	62	136	342	85	227	28	989
1963	148	51	150	338	107	233	28	1,055
1964	182	53	182	355	124	246	28	1,170
1965	185	52	170	363	141	247	31	1,189
1966	186	49	180	374	141	263	34	1,229
1967 ⁷	190	50	174	360	147	180	33	1,134
1968 ²	200	68	173	370	165	215	37	1,228
1969 ²	208	84	170	373	180	209	40	1,264
1970	223	105	171	389	193	211	46	1,336
1971	234	76	164	408	207	279	50	1,418
1972	288	91	186	438	221	315	61	1,600
1973 ^{2 3}	336	185	246	440	257	324	63	1,850
1974 ^{2 3}	392	288	314	450	300	340	66	2,150
<i>Percent of total deliveries of sugar, dextrose, and corn sirup</i>								
1957	5.0	2.6	9.3	27.2	11.0	40.3	19.6	14.4
1958	5.0	2.8	9.7	29.6	11.8	39.3	24.0	15.0
1959	5.7	2.8	10.8	29.1	12.7	38.5	29.2	15.0
1960	6.0	3.2	11.7	28.1	14.2	39.7	26.1	15.0
1961	6.6	3.4	11.9	27.4	14.8	39.0	28.1	14.9
1962	7.5	4.4	13.5	27.8	17.4	43.6	15.7	15.7
1963	9.5	3.4	14.3	26.8	19.4	44.3	17.3	15.9
1964	12.2	3.6	17.1	28.2	21.8	38.4	18.1	17.5
1965	11.8	3.1	16.3	26.7	23.5	33.6	20.1	16.7
1966	11.4	2.7	16.6	26.6	22.3	35.3	19.1	16.4
1967	11.3	2.7	16.6	25.6	23.0	25.8	19.2	15.1
1968	11.1	3.2	15.3	24.7	24.0	27.0	19.6	14.9
1969	11.9	3.8	15.2	25.6	25.2	27.1	20.3	15.4
1970	11.8	4.2	15.0	25.1	29.9	27.0	20.2	15.2
1971	13.2	3.1	13.4	26.9	26.9	28.7	21.4	15.9
1972	15.2	3.6	15.4	28.2	26.7	31.3	25.2	17.2
1973	16.9	6.9	18.8	28.6	29.9	32.1	23.3	19.2
1974	19.1	10.8	23.9	29.4	34.2	33.1	22.6	22.1

¹ Dry basis. ² Estimates. ³ Includes high-fructose corn sirup production.

Source: Sugar Report, Agr. Stabli. and Conserv. Serv., U.S. Dept of Agr., through 7/75, and Sugar Market News, Agr. Mkt. Serv., U.S. Dept. of Agr., 8/75 through 1/76.

nonfood purposes increased. These nonfood uses are mostly in products which involve fermentation, and in this respect these uses are similar to those of the baking industry.

The confectionery industry was the largest user of corn sirup, although the proportion going to that industry has declined somewhat since 1957. Corn sirup in the confectionery industry is largely used in the production of hard candies. It is very difficult to manufacture hard candy of good quality without corn sirup, which has averaged about 40 percent of the mixture in recent years. Comparatively little corn sirup has been used by the beverage or nonfood industries, but the other industrial groups have purchased substantial amounts.

By 1965, the distinction between corn sirup and dextrose became somewhat blurred. As presented, the

figures for dextrose refer to a highly refined product which has been crystalized and prepared as a dry product, although some of it may be converted to liquid form before sale. Corn sirup consists of a liquid containing a number of saccharides (sugars) in varying proportions. One of these saccharides is dextrose. The solid matter in some of the material sold as corn sirup contains as much as 96 percent dextrose. Such sirup can be used in some products as a substitute for crystalline dextrose, and this doubtless has had some effect on trends in the use of these products.

The average industrial use of caloric sweeteners during 1957-66 increased by about 264,000 tons per year (table 48). This was somewhat faster than the increase in total usage. Increased consumption of sugar accounted for approximately 72 percent of the total rise, corn sirup for 22 percent, and dextrose for 6

Table 48—Average annual increase in the use of caloric sweeteners by U.S. food and other processing industries, 1957-66¹

Industry	Sugar	Dextrose	Corn sirup	Total
--- 1,000 tons ---				
Canning	14	1	12	27
Dairy	16	(²)	12	28
Beverages	84	2	3	89
Baking	32	6	17	55
Confectionery	29	2	8	39
Other food	15	3	5	22
Nonfood	1	3	(²)	4
Total	191	16	57	264
--- Percent ---				
Canning	1.7	2.6	9.6	2.8
Dairy	4.1	3.9	14.2	5.7
Beverages	6.5	8.1	7.4	6.6
Baking	2.9	3.0	14.5	3.9
Confectionery	3.4	8.4	2.5	3.2
Other food	4.4	5.5	2.4	3.7
Nonfood	1.9	5.8	0.9	2.8
Total	3.9	4.2	6.0	4.3

¹ Least square trends, ² Less than 500 tons.

percent. The largest increase in sugar consumption—44 percent of the total—was in the beverage industry, where the increase in use of both dextrose and corn sirup was slight. The next largest growth in the use of sugar was in the baking and confectionery industries. These three industries accounted for over three-fourths of the total increase in deliveries to all industries.

The largest increase in the use of dextrose during 1957-66 was in sales to the baking industry, although the percentage rate of increase was slower than in any other industry. This apparent inconsistency is the result of the large quantity of dextrose used by the baking industry and the slow rate of growth in the use of dextrose in the industry.

Nearly three-fourths of the increased use of corn sirup has been in the baking, canning, and dairy industries. In the baking industry, sirup with a high dextrose content appears to have been used to some extent as a substitute for both sugar and dextrose. In the canning industry, nearly half of the increase in the use of caloric sweeteners was in the form of corn sirup. The most important use in the industry is in canned fruits where it is commonly used in a mixture with liquid sugar. The dairy industry's principal use of corn sirup is in manufacturing ice cream, sherbets, and similar items.

Recent Price Trends for Caloric Sweeteners

Since the end of World War II, the predominant trend in price of sugar has been slowly upward, with unusually rapid rises in 1963 and 1974 (table 49). The price of dextrose declined slowly from 1957 through

1962. It was unusually high in 1963, although the rise was not nearly so great as that for sugar. After declining in 1964 and 1965, dextrose prices increased in 1966. The 1966 price of dextrose, however, was only 6.6 percent above 1957, compared with 13.2 percent for sugar. Except for a rise in 1963, corn sirup prices generally trended downward from 1957 through 1965. There was a slight rise in 1966. The price of corn sirup in 1966 was 9 percent below that in 1957, in contrast to the increases in sugar and dextrose prices. Since 1966, prices of sugar and corn sweeteners have risen, but generally sugar prices have increased somewhat more rapidly.

Comparisons of sweetener prices, based on published quotations, never exactly represent the price situation that exists for an individual user. The quotations used for sugar and dextrose represent wholesale prices in 100-pound bags. Most industrial processors do not purchase these products on such terms. The price quotations for all three sweeteners relate to the New York City market. Much more of each of the products is used in markets distant from New York than in that metropolitan area, and price relationships are likely to be different in other areas. The differences in the trends of the quoted prices for the various caloric sweeteners may reflect, more accurately than the prices themselves, the shifting advantages to be obtained by a processor from using a larger or smaller proportion of one of the noncaloric sweeteners (15).

In some industries, increased use of corn sirup appears to have been caused mainly by its price decline relative to sugar. In other industries this change in price relationships was of little or no

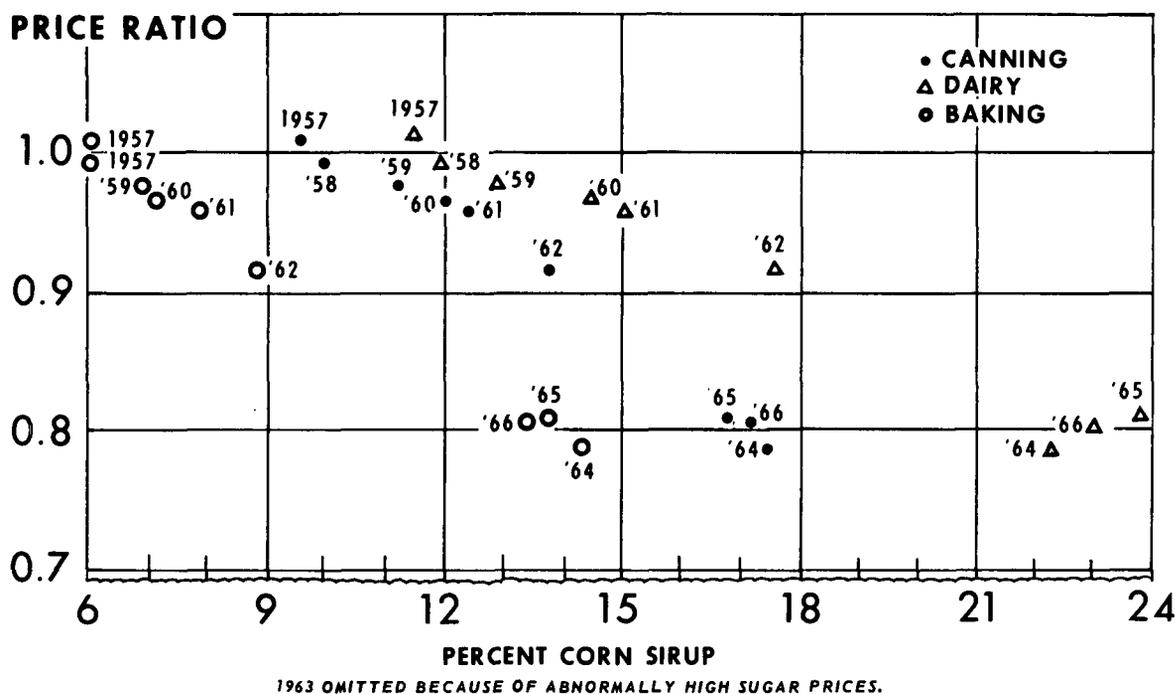
Table 49—Prices of sugar, dextrose, and corn sirup, 1957-74

Year	Refined sugar, wholesale, New York City ¹	Dextrose, New York City, dry basis ²	Corn sirup, New York City, dry, basis ³	Dextrose, relative to sugar, dry basis	Corn sirup, relative to sugar, dry basis
	--- Cents per pound ---			--- Percent ---	
1957	9.15	8.32	9.17	91	100
1958	9.27	8.33	9.18	90	99
1959	9.33	8.13	9.10	87	98
1960	9.43	8.13	9.12	86	97
1961	9.40	8.10	9.00	86	96
1962	9.60	8.04	8.73	84	91
1963	11.94	9.10	9.19	76	77
1964	10.68	8.85	8.36	83	78
1965	10.22	8.70	8.27	85	81
1966	10.36	8.87	8.34	86	81
1967	10.62	9.10	8.40	86	79
1968	10.84	9.27	7.85	86	72
1969	11.44	9.77	7.80	85	68
1970	11.97	10.20	8.46	85	71
1971	12.48	10.71	8.77	86	70
1972	13.09	10.07	5.78	77	44
1973	14.07	10.79	8.53	77	60
1974	34.35	12.27	13.21	51	38

¹ Basis price per 100-pound bag, subject to 2-percent discount. ² Hydrate, 100-pound bags, less than carlots, through 1963. Since April 1964, price is for 600-bag carload, f.o.b., New York. ³ Regular conversion sirup, in tank cars, f.o.b., New York.

Source: Sugar Report, Agr. Stabli. Conserv. Serv., U.S. Dept. of Agr., through 7/75.

INFLUENCE OF CORN SIRUP-SUGAR PRICE RATIO ON THE USE OF CORN SIRUP IN SELECTED INDUSTRIES, 1957-1966



U.S. DEPARTMENT OF AGRICULTURE

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Figure 2

importance. During 1957-66, a decline in the corn sirup-sugar price ratio of 0.10 percent was accompanied by an increase of 3.5 percentage points in the total quantity of sugar plus corn sirup used in the canning industry (except in 1964, when an exceptionally high price for sugar distorted the ratio) (fig. 2). In the dairy industry, the increase was 5.4 points, and in the baking industry, 3.9 points.

In other industrial uses, primarily beverages and confectionery, there appeared to be little relationship between changes in the corn sirup-sugar price ratio and the percentage of corn sirup used in the industry. Such use was small in the beverage industry and the advantage of lower cost in using an increased proportion of corn sirup in sweetening beverage products was apparently offset by quality considerations. Although the confectionery industry was the largest user of corn sirup, the reduction in costs that might have been made by increasing the proportion of corn sirup used appears to have been offset by adverse effects on quality which might have accompanied the change.

In the canning, baking, and dairy industries, quality problems either did not arise or the larger proportions of corn sirup may have improved the quality. On the one hand, the recent development of sirups containing high percentages of dextrose appears to have encouraged the increased use of sirup in the baking industry. On the other hand, the increased use of sirups containing a high proportion of maltose by the confectionery industry, plus lower prices for corn sirup, has not resulted in an increased proportion of corn sirup in the caloric sweeteners used in that industry.

Trends in the Use of Noncaloric Sweeteners

Saccharin has been the noncaloric sweetener used in significant volume in the United States in the sev-

enties, although cyclamate and mixtures of these were used extensively in the sixties. Saccharin has been used since early in the 20th century. Commercial production of cyclamate began in the fifties, and the use of mixtures of these became common early in the sixties. Comparatively few statistics are available concerning the production and consumption of saccharin and cyclamate. However, the use of saccharin prior to the sixties appears to have been confined largely to persons who, for reasons of health, could not use sugar, although during periods of wartime shortages of sugar saccharin use became more widespread. The use of cyclamate increased slowly during the fifties.

The most rapid growth in the use of saccharin-cyclamate mixtures was in soft drinks and in dry beverage bases. There was also considerable growth early in the sixties in retail sales of saccharin-cyclamate mixtures. Increased consumption in non-beverage food industries, such as canning, bakery, and confectionery, was appreciable but much slower. By 1967, noncaloric sweeteners, measured in terms of sweetening power relative to sugar, accounted for 6 to 7 percent of the approximately 12 million tons of caloric and noncaloric sweeteners consumed in the United States.

One unfavorable characteristic of both saccharin and cyclamate is that, in addition to tasting sweet, each has an off-flavor which is objectionable to many users. When saccharin and cyclamate are mixed, the sweetness is, in effect, additive, but the off-flavors are not. Consequently, it is possible to attain a higher degree of sweetness in various products without noticeable off-flavors by using mixtures of the two than can be attained by using either product alone. As a result, the use of mixtures increased rapidly. The use of cyclamate has been banned for several years; and a recent ruling requires that products containing saccharine, except those already on store shelves, carry warning labels.

RETROSPECT AND PROSPECT

Perhaps the most prominent, nearly universal, and continuous feature of the economic development of the sugar industry in past centuries has been the influence of governmental regulations on production, trade, and price (17). These influences can be traced in considerable detail since the establishment of the sugar industry in the Western Hemisphere following the discovery of America. They were probably important before that time, but very little information is available concerning governmental controls of the sugar industry before its establishment in the New World.

The attempt to compel all shipments from a colony to be made to the mother country was one of the first features of government regulation of the sugar trade

to assume importance in connection with the sugar industry in the New World. This was part of the attempt, made by all European countries with colonies, to make their colony a source of profit to the mother country. The early shipments of sugar were of very poor quality, because of the lack of needed machinery and skills in the colony. This led to the establishment of sugar refining plants in European countries. These refiners tended to become the center of the sugar trade in Europe, both as purchasers of raw sugar and as distributors of the refined product.

Sugar also soon became a favorite object of taxation, usually in the form of excise taxes or import duties on raw sugar. In this way the European countries obtained revenue from their colonies. The objec-

tion of the colonists to having profits reduced by such taxes was sometimes countered by the claim that the revenue was needed to help pay the expense of protecting the colony from its enemies in Europe and America.

In these respects, sugar did not differ greatly from other products produced in the colonies for export to Europe. It was, however, for a long time the most important of these products except for gold and silver. Not until the development of the beet sugar industry in the 19th century was there any important competition in Europe or the United States for cane sugar, which could be produced only in a tropical climate. The Western Hemisphere was the principal source of such sugar, although supplies from Asia, Africa, and Australia competed with those from the Americas.

Under these circumstances of limited competition, the absence of any effective substitute for cane sugar and the universal desire of consumers for a product of such pleasant taste, the sugar producing colonies of the world were generally prosperous. And the "sugar isles" of the Caribbean were among the most valuable colonial possessions of European nations.

Despite these favorable circumstances, the system had certain weaknesses which produced more or less chronic difficulties between colonies and mother countries. The regulation of the sugar trade largely ignored the economic advantages of trade in sugar and other commodities among colonies without the necessity of shipping the goods to Europe and back again. Of course, people in the colonies frequently managed to ignore those regulations that interfered most with their business operations. The usual result of this was smuggling, frequently involving both sugar and other commodities.

The smuggling of sugar was of great advantage to the people living in colonies where little or no sugar was produced. The 13 English Colonies on the mainland of North America were the largest and most populous of such areas. Also they possessed articles for export, such as lumber, salt pork, and dried fish, which were needed in the sugar producing areas. Often, the most advantageous place for trading was with Spanish or French colonies rather than English sugar producing colonies. Such smuggling deprived the English Government of the revenue it hoped to collect, and it limited the size of the market served by the English sugar producing colonies.

Although difficulties with the sugar trade undoubtedly were a factor causing the Revolutionary War, the independence of the United States resulted in less change in governmental control of the sugar trade in this country than might have been expected. The new Government needed money, and it promptly imposed import duties on the product. And the consumers gained little or nothing in the way of lower prices. Also, following the Louisiana Purchase in 1803, the import duty incidentally provided protection

for the first domestic sugar industry in the United States. This was the beginning of protection for the domestic sugar industry which has since continued in some form, as tariff, subsidy, or quota.

The first serious competitor for sugar obtained from sugarcane was the appearance of sugar from sugarbeets in the first half of the 19th century. This first became of commercial importance in European countries which formerly imported cane sugar. In France, Government regulations gradually assumed the function of protecting the beet industry and providing less attention to the sugar trade with French colonies. Other European countries with no sugar colonies, particularly Germany, Austria-Hungary, Italy and Russia, gradually adopted subsidy systems for their sugarbeet industries similar to those developed by France. Late in the 19th century, increased production of beet sugar in these countries led to the payment of export subsidies as a means of disposing of part of their supplies. At this point, a nation such as France had shifted from obtaining revenue for itself from a colonial sugar industry to supporting a domestic industry at considerable Government expense.

No beet sugar industry was developed in England in the 19th century. Rather, England gradually adopted free trade in sugar and became the principal recipient of subsidized sugar exports from various European countries, thus becoming part of the European beet sugar system. This acceptance of cheap subsidized sugar is the most important instance in the history of sugar marketing of a country neglecting the interests of its own sugar industry, and that of its colonies where sugarcane was grown, to obtain the advantage of cheap sugar for its consumers. The United States, to which European countries also exported beet sugar, reacted differently. It soon moved to protect its domestic sugar industry by establishing countervailing duties equal to the export subsidies paid by the country in which the sugar was produced.

The cost of subsidies to the governments of various European countries was a major factor bringing about the negotiation of the Brussels Sugar Convention of 1902, the first international sugar agreement and the only one dealing primarily with beet sugar. The agreement was successful in greatly reducing export subsidies, until World War I created a worldwide shortage of sugar and export subsidies were no longer a problem.

Although the United States was not greatly affected by the sugar export subsidies of Europe, events following the Spanish-American War produced marked changes in this country's regulations affecting sugar. The tariff remained the instrument of control, but it was gradually removed from shipments coming from Puerto Rico and the Philippines. Sugar from Cuba was granted a 20-percent preferential in tariff rates. These measures, together with the later addition of the quota system, largely determined the

sources of U.S. sugar imports until 1960 when imports from Communist Cuba ceased.

The first effect of World War I on the world's sugar industry was to destroy much of the beet sugar industry in Europe. This greatly increased the demand for sugar from countries exporting cane sugar. The largest response to this increased demand came from Cuba. As a result, Cuba became the world's largest exporter of sugar.

The demand for sugar from such tropical exporters as Cuba following World War I was reduced by the gradual restoration of the beet sugar industry in Europe, the reversal of Britain's sugar policy from free trade to protection for a newly developing beet industry in that country and tariff preferences for British colonies and dominions, together with sharply increased tariffs established by the United States, and similar protectionist moves by several other sugar-importing countries. The resulting economic decline in Cuba and elsewhere led to a succession of attempts to establish an international sugar agreement primarily for the relief of the sugar industries in exporting countries. Except for interruptions during World War II and one or two other lesser emergencies, attempts to establish or maintain international agreements for the protection of countries exporting sugar to the so-called "world" market have continued since the twenties and are still in effect.

Until 1975, quota systems and tariff preferentials, which channeled most of the world's sugar exports to specific countries, were somewhat reminiscent of the situation in colonial America when each European country with sugar producing colonies attempted to preempt the trade for its own benefit. One result was to divide the sugar trade of the world into fairly definite blocks. The price received by the exporter frequently varied substantially with the destination of the shipment. Political rather than economic considerations usually were the most important factor in determining the direction of international trade in sugar and which countries had the greatest access to markets with higher prices.

The production and marketing of starch sweeteners and of noncaloric sweeteners has not, in general, been subject to the same types of Government control as have characterized sugar throughout its history. International trade in such commodities is subject to import duties by most countries. But foreign trade in these commodities has generally not been large, and tariffs have been of lesser importance in determining the volume and direction of trade than has frequently been the case with sugar.

Starch and the noncaloric sweetener industries in the United States have been especially concerned with regulations relating to labeling and so forth. Use limiting effects of such regulations appear to have been even more restrictive in some European countries and sugar-exporting countries. Had regulations affecting use been less stringent, the consumption of both starch and noncaloric sweeteners would have likely increased more rapidly. Still, the consumption of starch sweeteners in the United States has increased substantially. Prices of corn and the value of byproducts have been important factors enabling corn sirup producers to maintain relatively low sirup prices and increase their share of the domestic sweetener market.

The emergence of high fructose sirup as an article of commerce in the United States is potentially of great importance. Technically, it might satisfy 50 percent or more of the total domestic sweetener demand. The extent of its growth seems primarily dependent on the relative costs of producing high fructose sirup and sugar. Commercial production of high fructose sirup began in 1968 but did not reach a volume of much commercial significance until 1974. Trade estimates suggest that sales of such sirups in 1975 may have equaled about 5 percent of the total sales of sugar, dextrose, and all types of corn sirup. Trade announcements indicated further increases in manufacturing capacity for high fructose sirup in the United States and lesser developments in a number of other countries.

At the present time, high fructose sirup containing 43 percent fructose, 50 percent glucose, and 7 percent higher saccharides is being produced only in liquid form. Commercial production of an ultrahigh fructose sirup has been announced. Further improvements are likely. Among the improvements believed possible by some people in the industry are (1) the eventual commercial production of sucrose from starch and (2) the production of sugars, such as glucose, fructose, and sucrose, from cellulose. These things can be done in the laboratory at the present time but at costs which make commercial production uneconomical. In its present form, high fructose sirup represents the first nutritive substance equal to sucrose in sweetness that has been manufactured from a nonsweet substance. In a sense, it ends an era in which sucrose occupied an exclusive position. So, these recent developments in sweetener production, use, and substitutability indicate that the future of sweeteners may be as interesting as the past.

BIBLIOGRAPHY

- (1) Aherne, Raymond J. and others
1965. *New York Coffee and Sugar Exchange, Inc., Its Role in the Marketing of Sugar*. Boston College Press.
- (2) Anuario Azucarero de Cuba (Cuba Sugar Year-book)
1959. *Cuban Sugar Census, National and International Statistical Manual*. Compiled and edited by Cuba Economica Y Financiera, Havana, Cuba.
- (3) Arrington, Leonard J.
1966. *Beet Sugar in the West; A History of the Utah-Idaho Sugar Company, 1891-1966*. Univ. Wash. Press. Seattle and London.
- (4) Artschwager, Ernstand Brandes, E. M.
1958. *Sugarcane (Saccharum Offirinaum L.) Origin, Classification, Characteristics and Descriptions of Representative Clones*. Agr. Handb. No. 122, U.S. Dept. Agr.
- (5) Aykroyd, Wallace Ruddell
1967. *The Story of Sugar Quadrangle Books*, Chicago.
- (6) Babst, Earl D.
1940. *Occassions in Sugar*, privately printed.
- (7) Bachman, J. R.
1962. *Story of the Amalgamated Sugar Company*. Published by Amalgamated Sugar Co., Ogden, Utah.
- (8) Ballinger, Roy A.
1946. *Sugar During World War II*. War Records Monograph-3, Bureau of Agr. Econ., U.S. Dept. Agr.
- (9) Ballinger, Roy A., and Larkin, L. C.
1962. *Sweeteners Used by Food Processing Industries, Their Competitive Position in the Canning Industry*. Agr. Econ. Rpt. No. 20, Econ. Res. Serv., U.S. Dept. Agr.
- (10) Ballinger, Roy A., and Larkin, L. C.
1963. *Sweeteners Used by the Dairy Industry, Their Competitive Position in the United States*. Agr. Econ. Rpt. No. 30, Econ. Res. Serv., U.S. Dept. Agr.
- (11) Ballinger, Roy A., and Larkin, L. C.
1963. *Sweetners Used by the Beverage Industry, Their Competitive Position in the United States*. Agr. Econ. Rpt. No. 31, Econ. Res. Serv., U.S. Dept. Agr.
- (12) Ballinger, Roy A., and Larkin, L. C.
1963. *Sweeteners Used by the Baking Industry, Their Competitive Position in the United States*. Agr. Econ. Rpt. No. 32, Econ. Res. Serv., U.S. Dept. Agr.
- (13) Ballinger, Roy A., and Larkin, L. C.
1963. *Sweeteners Used by the Confectionery Industry, Their Competitive Position in the United States*. Agr. Econ. Rpt. No. 48, Econ. Res. Serv., U.S. Dept. Agr.
- (14) Ballinger, Roy A., and Larkin, L. C.
1963. *Sweeteners Used by Food Processing Industries, Their Competitive Position in the United States*. Agr. Econ. Rpt. No. 37, Econ. Res. Serv., U.S. Dept. Agr.
- (15) Ballinger, Roy A.
1966. *Markets for Sweeteners*, ERS-323, Reprinted from "Agricultural Markets in Change." Agr. Econ. Rpt. No. 95, Econ. Res. Serv., U.S. Dept. Agr.
- (16) Ballinger, Roy A.
1967. *Noncaloric Sweeteners: Their Position in the Sweetener Industry*. Agr. Econ. Rpt. No. 113, Econ. Res. Serv., U.S. Dept. Agr.
- (17) Ballinger, Roy A.
1967. *Economic Research and World Sugar Problems*. Reprinted from "Agricultural Science Review," Vol. 5, No. 2, 2nd Qtr.
- (18) *The Beet Sugar Story*
1959. 3d Ed. Published by U.S. Beet Sugar Assn.
- (19) Bernhardt, Joshua
1920. *Government Control of the Sugar Industry in the United States*. The MacMillan Co., New York.
- (20) Bernhard, Joshua
1948. *The Sugar Industry and the Federal Government, A Thirty Year Record (1917-47)*. Sugar Statistics Serv., Washington, D.C.
- (21) Blakey, Roy G.
1912. *The United States Beet Sugar Industry*

- and the Tariff*. Studies in History, Economics and Public Law, Vol. XLVII, No. 2. Columbia Univ., New York.
- (22) Brandes, E. W., and others
1924. *Sugar*. Article in "Agriculture Yearbook, 1923," U.S. Dept. Agr.
- (23) Broeg, Charles B.
1954. *The Tariff Act and Sugar*. Article in "Sugar Reports," No. 29. Commodity Stabilization Serv., U.S. Dept. Agr.
- (24) Chapman, Charles E.
1927. *A History of the Cuban Republic*. The MacMillan Co., New York.
- (25) Clough, William
1866. *The Production of Sugar from Sorghum or Nothern Sugarcane*. Article in "Report of the Commissioner of Agriculture for the Year 1865." Washington, D.C.
- (26) Corn Industries Research Foundation, Inc.
1958. *Corn, Syrups and Sugars*. 2nd Edition.
- (27) Crosbie, William R.
1956. *History of the Cuban-American Sugar Company to the First Published Report in 1910*. Privately printed.
- (28) Deer, Noel
1949. *The History of Sugar*. Chapman and Hall, Ltd., London.
- (29) Dewing, A. S.
1913. *Corporate Promotions and Reorganizations*, pp. 47-111, Cambridge, 1913.
- (30) Edson, Hubert
1958. *Sugar, from Scarcity to Surplus*. Arr. for publication by Alfred E. Lewis. Chemical Publishing Co., New York.
- (31) Hawaiian Sugar Planters Association
1967. *Sugar Manual*.
- (32) Hirsch, Hans G.
1964. USDA. *European "Common Agricultural Policy" on Sugar*. ERS Foreign-89. Reprinted from "Foreign Agricultural Trade of the United States," June 1964.
- (33) Hirsch, Lon V.
1961. *Marketing in an Underdeveloped Economy: The North Indian Sugar Industry*. Prentice-Hall, Inc., Englewood Cliffs, N.J.
- (34) House of Representatives
1912. 62d Congress, 2d. Session, Rpt. 331. American Sugar Refining Co. and others.
- (35) Jones, Eliot
1921. *The Trust Problem in the United States*. The MacMillan Co., New York.
- (36) Jones, Phillip E., and Thomason, F G.
1951. *Competitive Relationships Between Sugar and Corn Sweeteners*. Agr. Info. Bull. No. 48, Production and Marketing Admin., U.S. Dept. Agr.
- (37) Kingsford, Thomason
1895. *One Hundred Years of American Commerce*. Ch. LXVIII. Edited by Chauncey M. Depew.
- (38) McGinnis, Editor
1951. *Beet Sugar Technology*. Reinhold Publishing Corp., New York.
- (39) Mead, George P.
1963. *Spencer-Meade Cane Sugar Handbook*. 9th Edition. John Wiley and Sons, Inc., New York—London.
- (40) Miller, Marshall E.
1954. *Sugar*. An article in Marketing, "The Yearbook of Agriculture." U.S. Dept. Agr.
- (41) Minneman, P. G.
1942. *The Agriculture of Cuba*. Foreign Agr. Bull. No. 2. U.S. Dept. Agr.
- (42) Needham, Enoch
1942. *Control of the Sugar Market During World War I*. Bureau of Labor Statistics, U.S. Dept. Labor.
- (43) Pan American Union
1958. *Sugar* (new edition), Washington, D.C.
- (44) Rubens, Horatio S.
1932. *Liberty, The Story of Cuba*. Brewer, Warren and Putnam, Inc., New York.
- (45) Scholl, John C., and Hurt, Leslie C.
1964. *Sugar and Other Sweeteners*. Article in Farmer's World. "The Yearbook of Agriculture." U.S. Dept. Agr.
- (46) Sitterson, J. Carlyle
1952. *Sugar Country, The Cane Sugar Industry in the South, 1753-1950*, Univ. Kentucky Press.
- (47) Steward, Stella, and Bernstein Irving
1942. *Sugar Rationing in 1918*. Historical Studies No. 27, Bureau of Labor Statistics, U.S. Dept. Labor.
- (48) *Sugar During the World War and in the 1939 European War*.
1940. Bureau of Agr. Econ., U.S. Dept. Agr.

- (49) Sugar Y. Azucar
Sept. 1968. *The Philippine Sugar Industry Looks to the Future*. Palmer Publications.
- (50) Swerling, B. C.
1949. *International Control of Sugar, 1918-41*, Commodity Policy Studies No. 7, Food Res. Institute, Stanford Univ. Press, Stanford, Calif.
- (51) Tacke, E. F., and others
1963. *The World Sugar Economy: Structure and Policies*. Vol. I, National Sugar Economies and Policies; Vol. II, The World Picture. International Sugar Council, London.
- (52) Taussig, Charles William
1940. *Some Notes on Sugar and Molasses Manufactured in the United States of America*.
- (53) Taussig, F. W.
1931. *The Tariff History of the United States*. Eighth Edition. G. P. Putnam's Sons, New York and London.
- (54) Taylor, Reed D.
1965. *Characteristics of the United States Producer Maple Sirup Markets*. The Pennsylvania State Univ., Ph.D. Thesis.
- (55) Timoshenko, Vladimir P., and Swerling, Boris C.
1957. *The World's Sugar; Progress and Policy*. Food Research Institute. Stanford Univ. Press, Stanford, Calif.
- (56) Truslow, Francis Adams
1951. *Report on Cuba*. "Findings and Recommendations of an Economic and Technical Mission Organized by the International Bank for Reconstruction and Development in Collaboration with the Government of Cuba in 1950." Chief of Mission. International Bank for Reconstruction and Development, Washington, D.C.
- (57) Tupper, Ellen S.
1865. *Beekeeping*. Article in *Report of the Commissioner of Agriculture for the Year 1865*. Washington, D.C.
- (58) United States Bureau of the Census
1864. *United States Census of Agriculture*. Washington, D.C.
- (59) United States Cuban Sugar Council
1952. *Sugar: Facts and Figures*. Privately printed.
- (60) United States Tariff Commission
1939. *Starches, Dextrines and Related Products*. Rpt. No. 138, 2d Series.
- (61) Vandercook, John W.
1939. *King Cane: The Story of Sugar in Hawaii*. Harper and Brothers Publishers, New York and London.
- (62) Vogt, Paul
1908. *The Sugar Refining Industry in the United States; Its Development and Present Condition*. Univ. Pennsylvania, Series in Political Economy and Public Law, No. 21.
- (63) Walden, Howard T., 2d
1966. *Native Inheritance: The Story of Corn in America*. Harper and Row, Publishers, New York and London.
- (64) Wilson, Earl B.
Undated (perhaps 1949). *Sugar and Its War-time Controls, 1941-1947*. Printed by Statistical Press, Inc., Limited Edition. Vol. I, II, III, and IV.
- (65) Wright, Philip Green
1931. *The Cuban Situation and Our Treaty Relations*. The Brookings Institute, Washington, D.C.

APPENDIX A

Sugar, raw and refined: Rate of import duty per pound, United States, 1789-1968

Item	Cents per pound
Act of July 4, 1789	
On brown sugars	1.00
On loaf sugars	3.00
On all other sugars	1.50
Act of August 10, 1790	
On loaf sugars	5.00
On brown sugars	1.50
On all other sugars	2.50
Act of June 5, 1794	
Same as August 10, 1790, except on refined sugar an additional	4.00
Act of June 7, 1795	
After June 30 on clayed or lumb sugar shipped to the United States: In	
United States vessels, an additional rate of	1.00
In foreign vessels, an additional rate of	1.10
Act of January 29, 1795	
" That after the said last day of March next, the present duties payable upon clayed sugars, shall cease and there shall be paid upon all white clayed or white powdered sugars - three cents per pound, and upon all other clayed or powdered sugars, one-and-one-half cents per pound."	
Act of March 3, 1797	
After June 30 next on all brown sugar, an additional duty of . . . . .	.50
Act of May 13, 1800	
On all brown sugar an additional duty of . . . . .	.50
Act of July 1, 1812	
Loaf sugar	18.00
White clayed and white powdered sugar	6.00
Brown, and brown clayed sugar	5.00
Act of April 27, 1816	
On brown sugars	3.00
White clayed or powdered sugar	4.00
Lump sugars	10.00
Loaf sugars	12.00
Act of July 14, 1832	
Brown sugar and sirup of sugarcane, in casks	2.50
White clayed sugar	3.33
Act of August 30, 1842	
Raw sugar and on brown clayed sugar	2.50
On all other sugars not refined	4.00
Refined sugar, including tintured, colored, or otherwise adulterated	6.00
Act of July 30, 1846	
Thirty per centum ad valorem on sugars of all kinds	
Act of March 2, 1861	
Raw sugar . . . . .	.75
Refined sugar	2.00
Refined sugar, when tintured, colored or adulterated	4.00
(Dutch standard of color test adopted)	
Act of August 5, 1861	
Sugars not above No. 12 Dutch standard of color	2.00
Sugars above No. 12 Dutch standard of color	2.50
Refined sugars	4.00
Refined sugars, when tintured, colored or adulterated	6.00
Act of December 24, 1861	
Raw sugar and sugars not above No. 12 Dutch standard	2.50
White and clayed sugars above No. 12 Dutch standard	3.00
Refined sugar	5.00
Refined sugar tintured or colored or adulterated	8.00
Act of July 14, 1862	
Sugars not above No. 12 Dutch standard of color	2.50
Sugars from No. 12 to No. 15 Dutch standard of color	3.00
Sugars above No. 15 and not above No. 20 standard of color	3.50
Refined sugar and sugar above No. 20 Dutch standard of color	4.00
Refined sugar when tintured, colored or adulterated	10.00
Act of June 30, 1864	
Sugars not above No. 12 Dutch standard of color	3.00
Sugars from No. 12 to No. 15 Dutch standard of color	3.50
Sugars from No. 15 to No. 20 Dutch standard of color	4.00
Refined sugar and sugar above No. 20 Dutch standard of color	5.00
Act of July 14, 1870	
Sugars not above No. 7 Dutch standard of color	1.75
Sugars from No. 7 to No. 10 Dutch standard of color	2.00
Sugars from No. 10 to No. 13 Dutch standard of color	2.25
Sugars from No. 13 to No. 16 Dutch standard of color	2.75
Sugars from No. 16 to No. 20 Dutch standard of color	3.25
Refined sugar and sugar above No. 20 Dutch standard of color	4.00
Act of March 3, 1875	
Increasing existing rate of 25 percent	
Act of June 3, 1875	
All raw sugar from Hawaii free as per treaty concluded January 30, 1875.	
(polariscope text adopted in combination with the Dutch standard in color test)	

See notes at end of Appendix A.

Item	Rate per pound			
	Raw		Refined	
	Full duty	Cuban	Full duty	Cuban
	<i>Cents</i>			
Act of March 3, 1883 (Morrill Act)	2.24	2.24	3.5	3.5
Act of October 1, 1890 (McKinley Act)	Free ¹	Free ¹	.5	.5
	<i>Percent</i>			
Act of August 17, 1894 (Wilson Bill) (ad valorem)	40	40	40 ²	40 ²
	<i>Cents</i>			
Act of July 24, 1897 (Dingley Bill)	1.685	1.685	1.95	1.95
On May 1, 1900, Puerto Rican sugar was Admitted into the United States at a reduction of 85% in the duty. Beginning with 1901, Puerto Rican sugar was admitted free in the United States. In 1902, the duty on Philippine sugars was reduced 25% from the then pre- vailing rate of 1.685 on raw sugar. Effective December 27, 1903, the duty on Cuban sugars was reduced 20% in accordance with the Reciprocity Act	1.685	1.348	1.95	1.56
Act of August 5, 1909 (Payne Act) admitted Philippine sugars into the U.S., free of duty to the extent of 300,000 tons.	1.685	1.348	1.95	1.52
Act of October 3, 1913 (Underwood Bill)	1.256	1.0048	1.36	1.088
1. Duty reduced approximately 25% effective March 1, 1914. 2. Philippine sugars admitted free, no limitation. 3. Placed sugar on the free list, effective May 1, 1916. On April 27, 1916, this provision was repealed.				
Act of May 27, 1921 (Emergency Tariff Act) . . .	2.00	1.60	2.16	1.728
Act of Sept. 22, 1922 (Fordney-McCumber Act) .	2.206	1.7648	2.39	1.912
Tariff Act of 1930 (Hawley-Smoot Act, June 18, 1930)	2.50	2.00	2.65	2.12
Proclamation (based on Tariff Commission Report) by President Roosevelt on May 9, 1934, effective June 8, 1934	1.875	1.50	1.9875	1.59
Cuban Reciprocal Trade Treaty, proclaimed on August 24, 1934 effective Sept. 3, 1934 . . .	1.875	.90	1.9875	.954
President Roosevelt on Sept. 11, 1939, suspended quotas, automatically restoring duty on Cuban sugar to rate effective previous to Treaty of 1934	1.875	1.50	1.9875	1.59
Suspension of quotas terminated by President On December 26, 1939 duty on Cuban sugar reverted to rate prior to suspension.	1.875	.90	1.9875	.954
Supplemental Cuban Trade Treaty, proclaimed December 29, 1941, effective January 5, 1942	1.875	.75	1.9875	.795
Reciprocal Trade Treaty with Peru proclaimed June 29, 1942, effective July 29, 1942 . . . . .	.9375	.75	.99375	.795
United States Conference on Trade and Employment, at Geneva. Agreement with Cuba signed on October 30, 1947, as effective January 1, 1948 . . . . .	.6875	.50	.72875	.53
Torquary Tariff Conference, Agreement with Dominican Republic and Peru announced by State Dept. on May 8, 1951, pro- claimed by President Truman on June 4, effective June 6, 1951 . . . . .	.625	.50	.6625	.53
Philippine Trade Act of 1946 Authorizing Agreement with the Philippines signed on July 4, 1946, effective July 4, 1954; amended by P.L. 83-474 (Act of July 5, 1954) and by Philippine Trade Agreement Revision Act of 1955, approved August 1, 1955 authorizing Revised Agreement signed Sept. 6, 1955, effective:				
January 1, 1956 . . . . .		.025		.0265
January 1, 1959 . . . . .		.05		.053
January 1, 1962 . . . . .		.10		.106
January 1, 1965 . . . . .		.20		.222
January 1, 1968 . . . . .		.30		.318

¹ A bounty of 2 cents per lb. was paid by the Government on domestic production, ² Plus 1/8 cents per pound.

See notes at end of Appendix A.

APPENDIX B

Chronology of Principal U.S. Government Sugar Controls During World War II, 1939-1947

- September 11, 1939**—The President suspended sugar quotas under the Sugar Act of 1937. As provided in the Reciprocal Trade Agreement of 1934 with Cuba, the tariff on raw sugar from Cuba was increased from 0.90 cent per pound to 1.50 cents when quotas were suspended.
- December 26, 1939**—The President restored sugar quotas, and the tariff on raw sugar from Cuba was lowered from 1.50 cents per pound to 0.90 cent.
- August 14, 1941**—First ceiling price established by the United States Government in the World War II period was for sugar at 3.50 cents per pound, raw sugar, duty paid, basis New York City.
- January 5, 1942**—Ceiling price of raw sugar was raised to 3.74 cents per pound, basis New York City, with small differentials for other refining ports.
- January 28, 1942**—The U.S. Government, through the Defense Supplies Corporation, contracted for the purchase of the entire 1942 Cuban sugar crop, except for the quantity needed for consumption in Cuba, for 2.65 cents per pound, raw value, f.o.b. Cuban ports. The equivalent of approximately 700,000 tons of sugar was purchased in the form of invert molasses under the contract, which specified that one-third of the crop was to be processed into invert molasses.
- April 14, 1942**—The President suspended sugar quotas under the Sugar Act of 1937.
- May 1, 1942**—Sugar rationing was established for industrial and institutional users.
- May 5, 1942**—Sugar rationing was established for household consumers.
- June 9, 1942**—The President of the United States and the Prime Minister of Great Britain jointly authorized the creation of the Combined Food Board to recommend international allocations of sugar and other foods in short supply.
- April 3, 1943**—The U.S. Government contracted for the purchase of 2,700,000 tons of Cuban raw sugar for 2.65 cents per pound, f.o.b. Cuban ports. The purchase contract provided that Cuba would limit the total production of sugar in Cuba in 1943 to not more than 3,225,000 tons of raw sugar.
- September 22, 1943**—The U.S. Government contracted for the purchase of the 1944 Cuban sugar crop, with the exception of 200,000 tons for consumption in Cuba, for 2.65 cents per pound, f.o.b. Cuban ports.
- April 1, 1944**—The U.S. Government contracted for the purchase of invert molasses from the 1944 Cuban sugar crop. The quantity of 1944 crop Cuban raw sugar previously contracted for from Cuba was reduced sufficiently to permit the production of the invert molasses.
- September 3, 1944**—A uniform ceiling price on raw sugar, duty paid for all refining ports, was established at 3.75 cents per pound by the U.S. Government.
- April 26, 1945**—The U.S. Government contracted for the purchase of the entire 1945 crop of Cuban sugar, less 454,320 tons for consumption in Cuba and "free" export chiefly to Latin America, at 3.10 cents per pound for raw sugar, f.o.b. Cuban ports.
- February 10, 1946**—The ceiling of raw sugar, duty paid, was raised to 4.205 cents per pound.
- July 1, 1946**—The International Emergency Food Council took over the activities of the Combined Food Board.
- July 16, 1946**—The U.S. Government contracted for the purchase of the 1946 and 1947 crops of Cuban sugar, less 704,196 tons in 1946 and 738,270 tons in 1947 for consumption in Cuba and "free" export chiefly to Latin America. The basic minimum price for the 1946 crop of Cuban raw sugar was 3.675 cents per pound f.o.b. Cuban ports; that for the 1947 crop was the highest price actually paid by the United States for any of the 1946 crop of Cuban sugar. These prices were subject to increase in the event of certain contingencies.
- September 18, 1946**—The ceiling price of raw sugar, duty paid, was raised to 5.575 cents per pound.

November 20, 1946—The ceiling price of raw sugar, duty paid, was raised to 5.94 cents per pound.

January 18, 1947—The ceiling price of raw sugar, duty paid, was raised to 6.125 cents per pound.

March 30, 1947—The ceiling price of raw sugar, duty paid, was raised to 6.185 cents per pound.

June 11, 1947—The rationing of sugar to household users was ended.

July 28, 1947—The rationing of sugar to industrial and institutional users was ended. This was the last commodity removed from ration control during World War II.

August 6, 1947—The ceiling price of raw sugar, duty paid, was raised to 6.32 cents per pound.

September 23, 1947—The International Emergency Food Council announced that sugar-importing countries would be permitted to exceed their previously recommended allocations of sugar. This, in effect, ended international sugar allocations.

October 31, 1947—All price ceilings on sugar were removed, ending all World War II price controls except rent.